10-15W isolated DC-DC converter with Ultra-wide, ultra-high 200 - 1500V DC Input for renewable energy

FEATURES

- Ultra-wide 200 - 1500VDC input voltage range
- Industrial grade operating temperature: -40℃ to +70℃
- High I/O isolation test voltage of 4000VAC
- High efficiency, low ripple & noise
- Input under-voltage protection, reverse input voltage protection, output short circuit, over-current, over–voltage protection
- Mounting: PCB mounting, Chassis mounting, DIN-Rail mounting available

RoHS

PV15-29BxxL series is a regulated DC-DC converter with an ultra-wide DC input range. The product features high efficiency, high reliability, high insulation and a high level of safety protection. This type of power supply is widely used in renewable energy industries such photo voltaic, power generation, energy storage, inverters and high voltage DC conversions. The converters provide multiple protection features and guarantee stable and safe operating environments even under abnormal working conditions.

Selection Guide

Part No.	Output Power	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 800VDC (%) Typ.	Capacitive Load (μF) Max.
PV15-29B05L	10W	5V/2000mA	70	6000
PV15-29B12L	15W	12V/1250mA	76	2000
PV15-29B15L		15V/1000mA	77	1500
PV15-29B24L		24V/625mA	79	470

Note: *Use suffix "A5" for chassis mounting and suffix "A6" for DIN-Rail mounting.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range		200	--	1500	VDC
Input Current	200VDC	--	--	130	mA
	1500VDC	--	--	25	
Inrush Current	200VDC	--	--	50	A
	1500VDC	--	--	150	
Under-voltage Protection		Lockout activation range: 170 - 185VDC Lockout deactivation range: 180 - 195VDC			
External Input Fuse		4A/1500VDC, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±2	--	%
Line Regulation	Full load	--	±1	--	
Load Regulation	0% -100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	150	300	mV
Temperature Coefficient		--	±0.02	--	%/℃
Short Circuit Protection		Continuous, self-recovery			
Over-current Protection		120% -300%Io, self-recovery			
Over-voltage Protection	5V output	≤8VDC			
	12/15V output	≤20VDC			
	24V output	≤30VDC			
Minimum Load		0	--	--	%
Start-up Delay Time **	200-1500VDC	--	--	3	s

Note: *The "Tip and barrel method" is used for ripple and noise test, please refer to PV Converter Application Notes for specific information.
**Start-up delay time Test conditions: full voltage input range, full output load range (The cooling-time between input power-off and power-on again is greater than 15s.)

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General Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input - output	Electric Strength Test for 1min.	4000	--	--	VAC
Operating Temperature			-40	--	+70	℃
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	95	%RH
Soldering Temperature		Wave-soldering	260 ± 5℃; time:5 - 10s			
		Manual-welding	360 ± 10℃; time:3 - 5s			
Power Derating		-40℃ to -25℃	2.67	--	--	%/℃
		+50℃ to +70℃	2.0	--	--	
Switching Frequency			--	65	--	kHz
Altitude			--	--	5000	m
MTBF			MIL-HDBK-217F@25℃ ⩾ 300,000 h			

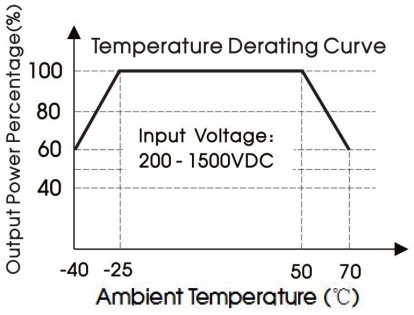
Mechanical Specifications

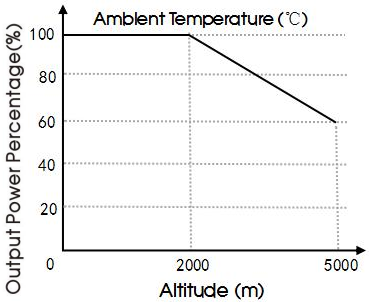
Case Material		Black flame-retardant and heat-resistant plastic (UL94V-0)
Dimension	Horizontal package	109.00 x 58.50 x 30.00mm
	A5 chassis mounting	135.00 x 70.00 x 38.50mm
	A6 Din-Rail mounting	137.00 x 70.00 x 44.00mm
Weight	Horizontal package	270g (Typ.)
	A5 chassis mounting	350g (Typ.)
	A6 Din-Rail mounting	425g (Typ.)
Cooling Method		Free air convection
Note: Avoid washing the shell with the PCB water directly, it is recommended to use alcohol to clean or wipe it.		

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV /Air ±8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (See Fig. 2 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±1KV (See Fig. 2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A

Product Characteristic Curve





Note: ①This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.

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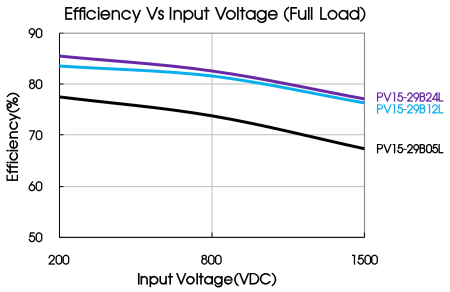

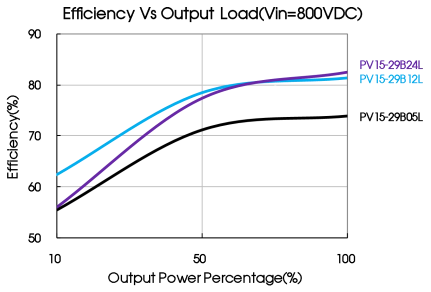

Design Reference

1. Typical application

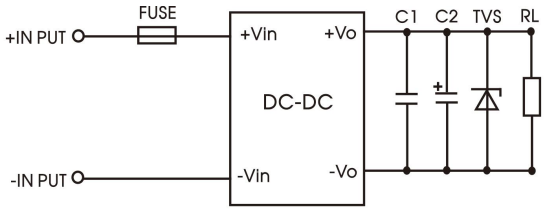

Fig. 1: Typical application circuit

Model	FUSE	C1(μF)	C2(μF)	TVS
PV15-29B05L	4A/1500VDC, required	1	120	SMBJ7.0A
PV15-29B12L			120	SMBJ20A
PV15-29B15L			120	SMBJ20A
PV15-29B24L			68	SMBJ30A

Note on filter components:
We recommend using an electrolytic capacitor with high frequency and low ESR rating for C2 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor, used to filter high-frequency noise. TVS is a recommended suppressor diode to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

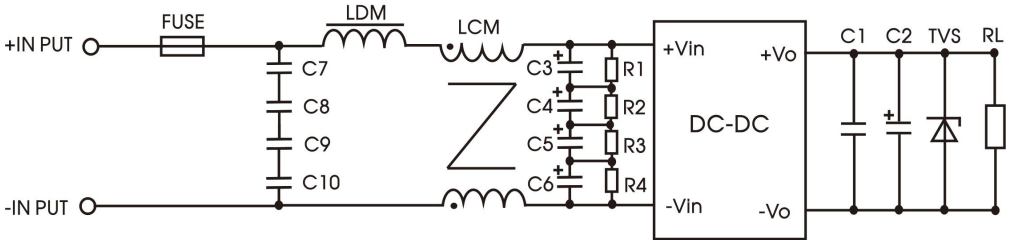

Fig 2: EMC application for higher compliance requirements (output parameters are show in Figure 1)

Element model	Recommended value
C7、C8、C9、C10	0.1uF /275VAC
C3、C4、C5、C6	47uF/450VDC
R1、R2、R3、R4	1MΩ/2W
LDM	330uH/0.38A
LCM	7mH (recommended to use MORNSUN's FL2D-10-702B)
FUSE	4A/1500VDC, required

3. For additional information please refer to application notes on www.mornsun-power.com.

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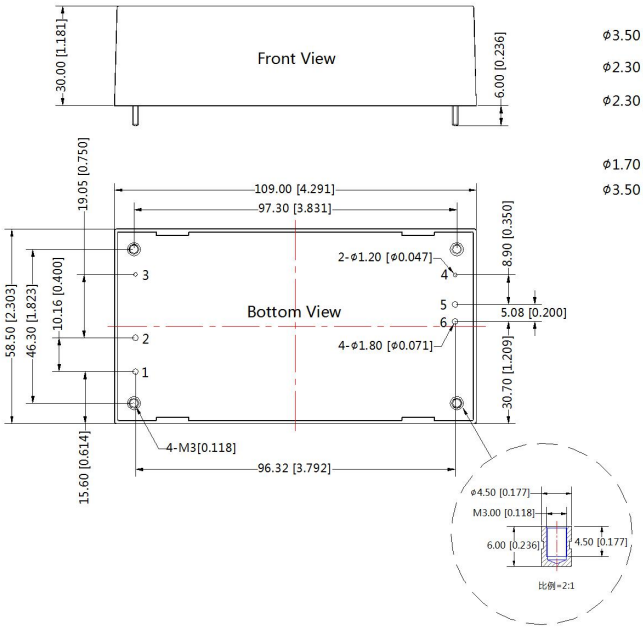
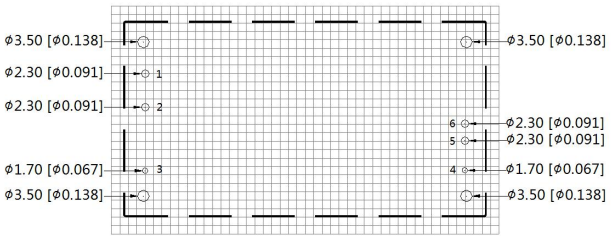
Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





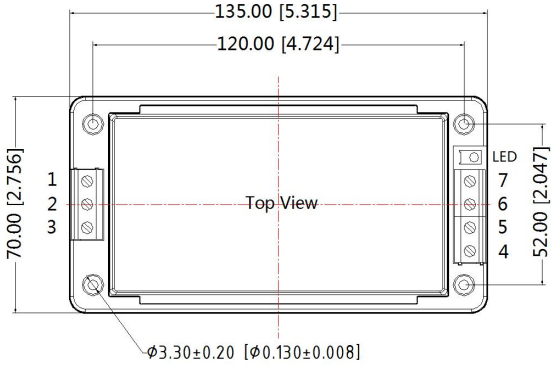
Note : Grid 2.54*2.54mm

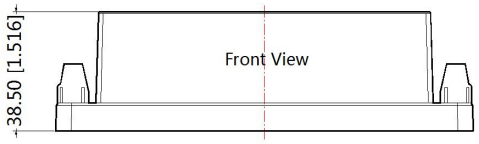
Pin-Out	
Pin	Function
1	+Vin
2	-Vin
3	NC
4	NC
5	-Vo
6	+Vo

Note:
Unit: mm (inch)
Pin1, 2, 5, 6's diameter: 1.80 (0.071), pin 3, 4's diameter: 1.20(0.047)
Pin diameter tolerances: ±0.10 (±0.004)
Pin tolerances (H): ±1.50 (±0.059)
General tolerances: ±0.50(±0.020)
This serise of products need to fix screws in a bad vibration environment.

A5 Chassis mounting Dimensions

THIRD ANGLE PROJECTION





Pin-Out	
Pin	Function
1	+Vin
2	NC
3	-Vin
4	NC
5	NC
6	-Vo
7	+Vo

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.040]

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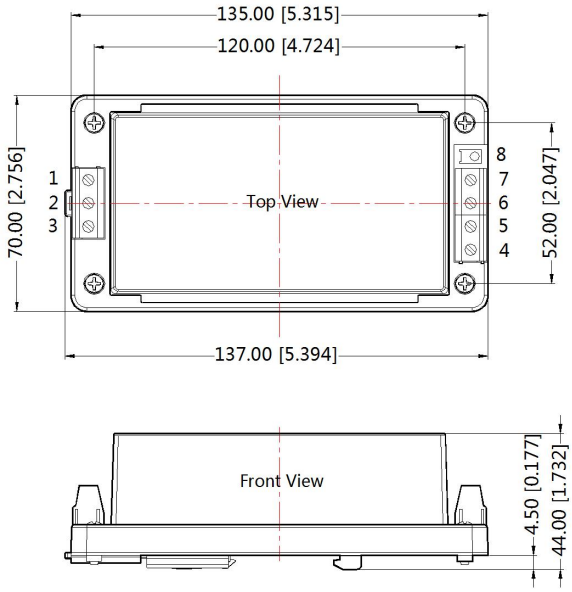
A6 Din-Rail mounting Dimensions

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Function
1	+Vin
2	NC
3	-Vin
4	NC
5	NC
6	-Vo
7	+Vo

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ±1.00[±0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number of Horizontal package: 58220020; the packaging bag number of A5/A6 package: 58220031;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. IIn order to improve the efficiency, there will be audible noise generated when working at input voltage higher than 1000 VDC, but it does not affect product performance and reliability;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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